

## Some Singapore Boletinae.

BY

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On August 21st, 1917, during a period of frequent showers, an hour's work in a narrow strip on the east side of the Gardens' Jungle in the Singapore Botanical Gardens produced specimens of sixteen species, representing four generic groups, of the Boletinae. It would not have been possible to duplicate this remarkable showing on any subsequent day of the year. Evidently there had been optimum conditions for Boleti just previous to August 21st.

Diagnoses of all these species were prepared from the living plants, measurements taken from many specimens, and vertical section outlines made, after which the material was rapidly and carefully dried. The species fall into four generic groups, provided *Boletopsis* be considered of generic value. The genus *Phylloporus* of Quelet, with spores formed by anastomosing lamellae, is well represented by *Phylloporus malaccensis* (No. 5004). *Strobilomyces* finds a characteristic representative in *S. porphyrius* (No. 5002). The genus (or subgenus) *Boletopsis* is represented by three very distinct species, *B. icterinus*, *B. singaporenensis*, and *B. corrugatus*.

Among the sixteen species there are represented three distinct types of spores: 1st, the usual type for *Boletus*, including those of most of the species: 2nd, a banded type, the spores bearing narrow longitudinal bands in relief, as in *Boletopsis singaporenensis* and *Strobilomyces prophryrius*: 3rd, a reticulate type, the spores being strongly reticulate-alveolate, a remarkable feature found also in *Tuber*, but quite unique in *Boletus*. This type is represented by one species, *Boletus retisporus*.

All of these species have been compared, with great care, with species which have been recorded from the Far East by Berkeley, Petch, and others, and especially with those described by Massee from the collections of Ridley. With the full descriptions taken from living specimens, it has been found impossible to crowd any of these species into the congeries of forms under previously recorded names. Indeed, it would be only the purest guess-work, with any comparisons of existing herbarium material. It must be understood that most of the conspicuous characters of the living plants are evanescent and that but the remotest conception of the living plant can be had from a dried specimens unaccompanied by detailed data taken from the living plant. Colored drawings alone will not suffice, since many clearly diagnostic characters cannot be

shown in such drawings. Even the simple process of drying, which was uniform for all the species, brought out various striking differences. For instance in *Boletus spinifer* and *Boletus umbrinellus*, as well as in most of the other species, the flesh is very firm and holds its form well while drying, whereas in *Boletus retisporus* and *Strobilomyces porphyrius*, the flesh softens very rapidly, collapse taking place before drying is accomplished. On the other hand, one species, *Boletus tristis*, dried out very readily and rapidly without the aid of heat, just as it lay, on an open table.

The characterisations of all the species under consideration are presented herewith in synoptical form, using for separation, where possible, the most readily recognizable characters, so that other students may easily follow up the work and make more extensive comparisons of living material and of material from other parts of the Peninsula.

Section I. Young plants with a distinct veil, and a persistent or evanescent, fibrous or gelatinous, annulus; springing from white mycelium (*Boletopsis*).

A. Veil gelatinous; pileus pale brown, radially irregularly shallowly corrugate, and centrally short tomentose, the outer half viscid; hymenium pale yellow; stipe brownish, paler above, short shaggy and covered with gelatinous droplets; flesh cream colored, with a reddish tint near upper surface of pileus: pileus 4—4.5 cm. in diameter; stipe 6—12 mm. × 6 cm.: spores elliptical, very pale, nearly white, 12 × 5 microm.; tomentum of pileus forming an erect pile, 100—300 microm. in height; plant occurring in large tufts (No. 5003).

***Boletopsis corrugatus*, sp. nov.**

AA. Veil fibrous.

B. Veil thick, arachnoid, bright yellow; annulus appressed and adherent, ragged scaly: pileus and stipe sulphur yellow, mealy, opaque; hymenium pale leather colored; stipe becoming minutely brownish scaly; flesh of pileus white, of stipe yellow; pores shallow, minute, subterete, septa thick and dark lined; hymenial surface narrowly and slightly sinuate where it joins stipe; pileus 2.5—3 cm. in diameter; stipe 3—5 mm. × 4—5.5 cm.; spores elliptical, smooth, pale in color, 8—14 × 4—5 microm.; hyphal threads of the veil with brown granulations (No. 4991).

***Boletopsis icterinus*, sp. nov.**

BB. Veil thin, membranous, viscid, at first white, finally leaving a completely separated and ragged and evanescent annulus; pileus smooth, shining, slightly viscid, and light bay in color; hymenium sordid yellow, stipe shining light bay, pale above; flesh of pileus faintly yellowish, of stipe white changing; pores large, deep very irregular, with

some secondary septa; septa thin and unlined; hymenial surface narrowly but very deeply sinuate next stipe, the stipe free to the pileus; pileus 4.5 cm. in diameter; stipe 6—12 mm.  $\times$  14 cm.: spores brown, ovoid, with narrow longitudinal raised bands, 13—15  $\times$  8—10 microm. (No. 4992).

**Boletopsis singaporenensis**, sp. nov.

Section II. Without distinguishable veil or annulus even in young plants: springing from either white or yellow mycelium (*Boletus*, *Phylloporus*, *Strobilomyces*).

- A. Pores large, very irregular and largely compound, with thin septa and with short secondary septa subdividing the larger pores into two or three.
- B. Hymenial surface decurrent on to stipe; plants solitary, from bright yellow mycelium; pileus leather colored, minutely roughened, opaque; hymenium sordid yellowish; stipe pale below, thickly streaked with reddish brown above; flesh of pileus and stipe cream colored, not changing; pileus 4.5—6 cm. in diameter; stipe slender 4—8 mm.  $\times$  3.5—5.5 cm.; spores elliptical, smooth, very pale, 6—8  $\times$  4—4.5 microm. (No. 4993).

**Boletus aureo-mycetinus**, sp. nov.

- BB. Hymenial surface deeply and rather broadly sinuate next stipe; plant in groups of 2 to 4 or more, from a white mycelium; pileus rich velvety bay; hymenium grey; stipe pale brownish nearly smooth; flesh of pileus and stipe white, not changing; pileus 7—10 cm. in diameter, stipe greatly inflated, 2.5—4.5 cm.  $\times$  8—10.5 cm.: spores ovoid, smooth, nearly white, 6  $\times$  5 microm.; cystidia numerous, very prominent, rigid and reddish, 60  $\times$  10 microm., thus resembling the cystidia of *Hymenochaete*. (No. 4994).

**Boletus spinifer**, sp. nov.

- AA. Pores large, to medium, or small, more regular, largely simple.
- B. Flesh not changing to blue on bruising: pileus smooth or nearly so.
  - C. Plant springing from white mycelium.
  - D. Pileus some shade of brown or sooty brown; stipe white to brownish or drab.
    - E. Pileus minutely mealy or velvety, dry, opaque, never smooth and shining.
    - F. Pileus sooty-mealy, or velvety, quite blackened with this over the umber ground color.
    - G. Flesh white, not changing.

H. Pileus umber to chocolate brown, more or less sooty mealy centrally; hymenium cream colored, often with a slight yellowish tint, its surface next stipe very slightly sinuate or nearly adnate; stipe umber brown, white at top and bottom; pileus 2.5—3.5 cm. in diameter, stipe 5—8 mm.  $\times$  4.5—5.5 cm.; spores fusiform, light brown, 12—14  $\times$  4 microm. (No. 4995).

**Boletus tristis**, sp. nov.

HH. Pileus deep sooty-velvety throughout; hymenium pale yellow, its surface next stipe distinctly but narrowly sinuate; stipe reddish brown, base white; pileus 5.5 cm. in diameter; stipe 9—10 mm.  $\times$  7 cm.; pores very small and nearly terete; spores elliptic-cuneiform, yellowish brown, 12  $\times$  6 microm. (No. 5005).

**Boletus phaeocephalus**, sp. nov.

GG. Flesh cream colored to brownish, blackening on exposure; pileus sooty and sooty-mealy; hymenium pale bay; stipe sooty; pileus 4.75 cm. in diameter; stipe 7—10  $\times$  6 cm.; spores fusiform, pale, 10—12  $\times$  3—4 microm.; cystidea abundant, pale, 30  $\times$  12 microm. (No. 4996).

**Boletus nigricans**, sp. nov.

FF. Pileus not sooty-mealy, or sooty-velvety, color paler; flesh white, not changing.

G. Stipe finely or coarsely scrobiculate, at least in part.

H. Stipe finely scrobiculate above; surface of pileus usually minutely reticulately broken; pileus dark umber-brown; hymenium pale

umber, its surface nearly adnate to stipe; stipe white below to pale umber above; pileus 6—8 cm. in diameter; stipe 7—12 mm.  $\times$  7—10 cm. spores elliptical, pale brown,  $12 \times 3$ —4 microm. (No. 4997).

**Boletus umbrinellus**, sp. nov.

HH. Stipe deeply, irregularly, very coarsely, sulcate-sclerobulcate throughout, more finely above; surface of pileus not broken, pale yellowish brown, darker centrally; hymenium pale drab; stipe cream colored; pileus 4 cm. in diameter; stipe 10—12 mm.  $\times$  5 cm.; spores fusoid, pale,  $12 \times 6$  microm. (No. 5004).

**Phylloporus malaccensis**, sp. nov.

GG. Stipe not sclerobulcate; surface of pileus velvety and unbroken.

H. Stipe smooth; pileus leather colored, smooth, opaque; hymenium very pale drab; stipe leather colored, smooth, paler above; pileus 3.5—6.5 cm. diameter; stipe 5—10 mm.  $\times$  4.5—6.5 cm.; spores elliptical,  $7$ —9  $\times$  4 microm., very pale (No. 4998).

**Boletus veluticeps**, sp. nov.

HH. Stipe finely, openly, transverse scaly throughout, finer at top and bottom; pileus drab throughout, stipe blue-grey; hymenium yellowish brown, its surface next stipe very narrowly sinuate; flesh pale drab throughout, slightly darkening on exposure; pileus 4 cm. in diameter; stipe 7—8 mm.  $\times$  6.5 cm.; spores elliptical, pale,  $12$ — $15 \times 4$  microm. (No. 5006).

**Boletus cyanopus**, sp. nov.

EE. Pileus perfectly smooth, shining, slightly viscid, pale leather colored; hymenium sordid yellow; stipe pale sordid leather colored, darker and shallowly somewhat reticulately fibrillose above; flesh cream colored, not changing; pileus 3.5—4.5 cm. in diameter; stipe 5—10 mm.  $\times$  4—5 cm.; spores elliptical, very pale, 8—10  $\times$  4—5 microm. (No. 4999).

***Boletus viscidulus*, sp. nov.**

DD. Pileus and stipe brick red, quite smooth, and opaque; hymenium yellow, surface next stipe rather deeply sinuate; stipe shallowly reticulate-fibrillose above; flesh of pileus pale yellow, of stipe bright yellow becoming reddish on exposure; pileus 4—9 cm. in diameter; stipe 8—17 mm.  $\times$  7—10 cm.; spores brown, elliptical, 12  $\times$  9 microm. reticulate-alveolate, the alveolae profound and 4, 5, or 6 sided (No. 5000).

***Boletus retisporus*, sp. nov.**

CC. Plant springing from bright yellow mycelium; flesh of stipe and pileus yellow, not changing; pileus yellowish brown, opaque, nearly smooth; hymenium pale leather colored, slightly sinuate; stipe with reddish brown and yellowish shades; pileus 12—14 mm. in diameter; stipe 1.5—2 mm.  $\times$  2.5 cm.; spores elliptical, hyaline, 9—12  $\times$  4—5 microm. (No. 5001).

***Bolitus pernarius*, sp. nov.**

BB. Flesh changing to blue on bruising; pileus deeply squarrose, purple scaly, exposing lines of yellow tissue beneath; hymenium sordid yellowish; stipe umber brown, smooth; flesh of pileus above yellow, below and of stipe, cream colored, darkening on exposure; pileus 3.5—4.5 cm. in diameter; stipe 6—8 mm.  $\times$  6—9 cm.; spores ocre-colored, elongate elliptical, longitudinally striate, 15—20  $\times$  6—8 microm. (No. 5002).

***Strobilomyces porphyrius*, sp. nov.**